TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

10,000 Gallon AST - Horizontal Tank
McCall, Idaho

Annual Emission Calcaulations	
Standing Losses (lb):	1.5664
Vapor Space Volume (cu ft):	856.4342
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0419
Vented Vapor Saturation Factor:	0.9989
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	856.4342
Tank Diameter (ft):	8
Effective Diameter (ft):	16.5109
Vapor Space Outage (ft):	4
Tank Shell Length (ft):	26.75
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	0.0051
Daily Avg. Liquid Surface Temp. (deg. R):	512.483
Daily Average Ambient Temp. (deg. F):	50.9208
Ideal Gas Constant R	
(psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.6108
Tank Paint Solar Absorptance (Shell):	0.17
Daily Total Solar Insulation	

Factor (Btu/sqft day):	1,400.54
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0419
Daily Vapor Temperature Range (deg. R):	23.7125
Daily Vapor Pressure Range (psia):	0.0022
Breather Vent Press. Setting Range(psia):	0.06
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0051
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0041
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0062
Daily Avg. Liquid Surface Temp. (deg R):	512.483
Daily Min. Liquid Surface Temp. (deg R):	506.5548
Daily Max. Liquid Surface Temp. (deg R):	518.4111
Daily Ambient Temp. Range (deg. R):	23.675
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9989
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0051
Vapor Space Outage (ft):	4
Working Losses (lb):	1.2693
Vapor Molecular Weight (lb/lb-mole):	130
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0051
Annual Net Throughput (gal/yr.):	81,000.00
Annual Turnovers:	8.1
Turnover Factor:	1
Tank Diameter (ft):	8
Working Loss Product Factor:	1
Total Losses (lb):	2.8356

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

10,000 Gallon AST - Horizontal Tank
McCall, Idaho

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	1.27	1.57	2.84

) Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
0.0062	130			188	Option 1: VP50 = .0045 VP60 = .0065

Knife River, Inc.
Portable Hot-Mix Asphalt Plant Permit Application
7,000 Gallon Deisel Tank

Generator fuel consuption (gal/hr)	4.5
Hours of operation per year	1,000
Total gallons fuel consumption (gal/yr)	4500

Tank Dimensions						
Length (ft)	Diameter (ft)	Capacity (gal)	Throughput (No/yr)[1]	VOC emissions (lb/yr)[2]	VOC emissions (lb/hr)	VOC emissions (t/yr)
18.5	10.5	7000	0.64	1.17	1.34E-04	5.85E-04

Emission Type	CAS No	Emission Estimate[3] (lb/yr)	Emission Estimate[4] (lb/hr)	IDAPA 58.01.01.585 /586 - EL (lb/hr)	PTE Emission Rate vs. EL
No. 2 Fuel Oil		1.17	1.3E-04	NA	NA

[1] Assumed 125 gallons per month usage from November through February, and 500 gallons per month usage March through October.

[2] Volatile Speciation for Dieseel based on USAF Institute for Environment, Safety, and Occupational Risk Analysis, 1999

[3] Emission estimate based on EPA Tanks Program Version 4.0.9d -see attached

[4] UST pound per hour emissions based on 8,760 hours per year

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Knife River 7,000 gallon diesel tank
City:	McCall
State:	Idaho
Company:	Knife River
Type of Tank:	Horizontal Tank
Description:	7,000 gallon Diesel AST

Tank Dimensions

Shell Length (ft):	18.75
Diameter (ft):	8
Volume (gallons):	7,000.00
Turnovers:	0.64
Net Throughput(gal/yr):	4,494.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Boise, Idaho (Avg Atmospheric Pressure = 13.28 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Knife River 7,000 gallon diesel tank - Horizontal Tank
McCall, Idaho

		Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp	Vapor Pressure (ps	
Mixture/Component	Month	Avg.	Min.	Max.	(deg F)	Avg.	Min.
Distillate fuel oil no. 2	All	52.81	46.88	58.74	50.94	0.0051	0.0041

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Knife River 7,000 gallon diesel tank - Horizontal Tank
McCall, Idaho

Annual Emission Calcaulations	
Standing Losses (lb):	1.0979
Vapor Space Volume (cu ft):	600.3043
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0419
Vented Vapor Saturation Factor:	0.9989
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	600.3043
Tank Diameter (ft):	8
Effective Diameter (ft):	13.8233
Vapor Space Outage (ft):	4
Tank Shell Length (ft):	18.75
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0051
Daily Avg. Liquid Surface Temp. (deg. R):	512.483
Daily Average Ambient Temp. (deg. F):	50.9208
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.6108
Tank Paint Solar Absorptance (Shell):	0.17
Daily Total Solar Insulation Factor (Btu/sqft day):	1,400.54
Vapor Space Expansion Factor	

Vapor Space Expansion Factor:	0.0419
Daily Vapor Temperature Range (deg. R):	23.7125
Daily Vapor Pressure Range (psia):	0.0022
Breather Vent Press. Setting Range(psia):	0.06
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0051
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0041
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0062
Daily Avg. Liquid Surface Temp. (deg R):	512.483
Daily Min. Liquid Surface Temp. (deg R):	506.5548
Daily Max. Liquid Surface Temp. (deg R):	518.4111
Daily Ambient Temp. Range (deg. R):	23.675
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9989
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0051
Vapor Space Outage (ft):	4
Working Losses (lb):	0.0704
Vapor Molecular Weight (lb/lb-mole):	130
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0051
Annual Net Throughput (gal/yr.):	4,494.00
Annual Turnovers:	0.642
Turnover Factor:	1
Tank Diameter (ft):	8
Working Loss Product Factor:	1
Total Losses (lb):	1.1683

TANKS 4.0.9d

Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Knife River 7,000 gallon diesel tank - Horizontal Tank
McCall, Idaho

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.07	1.1	1.17
Distillate fuel oil no. 2	0.07	1.1	1.17

	Vapor Mol.	Liquid Mass	Vapor Mass	
;ia)				Basis for Vapor Pressure
Max.	Weight.	Fract.	Fract.	Calculations
0.0062	130			Option 1: VP50 = .0045 VP60 = .0065

Knife River, Inc.
Portable Hot-Mix Asphalt Plant Permit Application
7,000 Gallon Deisel Tank

Assumptions

Percent No 6 Fuel Oil	0.06	
HMA Production rate	300 (ton/hr)	600,000 (lb/hr)
Specific Gravity No 6 Fuel Oil	0.97	
No 6 Fuel Oil usage	36000 (lb/hr)	
Hours of Operation	1667 (hour/yr)	
Annual No 6 Fuel OIl Usage	7416233 (gal/yr)	

Tank Dimensions						
Length (ft)	Diameter (ft)	Capacity (gal)	Throughput (No/yr)[1]	VOC emissions (lb/yr)[2]	VOC emissions (lb/hr)	VOC emissions (t/yr)
35	13.08	35000	212	2.22	2.53E-04	1.11E-03

Emission Type	CAS No	Emission Estimate[3] (lb/yr)	Emission Estimate[4] (lb/hr)	IDAPA 58.01.01.585/ 586 - EL (lb/hr)	PTE Emission Rate vs. EL
No. 2 Fuel Oil		2.22	2.5E-04	NA	NA

[1] Assumed 229,012 gallons per month usage from November through February, and 812,994 gallons per month usage March through October.

[2] Volatile Speciation for Dieseel based on USAF Institute for Environment, Safety, and Occupational Risk Analysis,

[3] Emission estimate based on EPA Tanks Program Version 4.0.9d -see attached

[4] UST pound per hour emissions based on 8,760 hours per year

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Hot Mix Asphalt Tank
City:	Boise
State:	Idaho
Company:	Knife River
Type of Tank:	Horizontal Tank
Description:	35,000 gallon heated tank

Tank Dimensions

Shell Length (ft):	35
Diameter (ft):	13.08
Volume (gallons):	35,000.00
Turnovers:	212
Net Throughput(gal/yr):	7,420,000.00
Is Tank Heated (y/n):	Y
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	0
Pressure Settings (psig)	0

Meterological Data used in Emissions Calculations: Boise, Idaho (Avg Atmospheric Pressure = 13.28 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Hot Mix Asphalt Tank - Horizontal Tank
Boise, Idaho

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.
Residual oil no. 6	All	300	280	320	300	0.0002	0.0002	0.0002

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Hot Mix Asphalt Tank - Horizontal Tank
Boise, Idaho

Annual Emission Calcaulations	
Standing Losses (lb):	0.2549
Vapor Space Volume (cu ft):	2,995.53
Vapor Density (lb/cu ft):	0
Vapor Space Expansion Factor:	0.0527
Vented Vapor Saturation Factor:	0.9999
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	2,995.53
Tank Diameter (ft):	13.08
Effective Diameter (ft):	24.1492
Vapor Space Outage (ft):	6.54
Tank Shell Length (ft):	35
Vapor Density	
Vapor Density (lb/cu ft):	0
Vapor Molecular Weight (lb/lb-mole):	190
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0002
Daily Avg. Liquid Surface Temp. (deg. R):	759.67
Daily Average Ambient Temp. (deg. F):	50.9208
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	759.67
Tank Paint Solar Absorptance (Shell):	0.17
Daily Total Solar Insulation	

Factor (Btu/sqft day):	1,400.54
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0527
Daily Vapor Temperature Range (deg. R):	40
Daily Vapor Pressure Range (psia):	0
Breather Vent Press. Setting Range(psia):	0
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0002
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0002
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0002
Daily Avg. Liquid Surface Temp. (deg R):	759.67
Daily Min. Liquid Surface Temp. (deg R):	739.67
Daily Max. Liquid Surface Temp. (deg R):	779.67
Daily Ambient Temp. Range (deg. R):	23.675
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9999
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0002
Vapor Space Outage (ft):	6.54
Working Losses (lb):	1.9654
Vapor Molecular Weight (lb/lb-mole):	190
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0002
Annual Net Throughput (gal/yr.):	7,420,000.00
Annual Turnovers:	212
Turnover Factor:	0.3082
Tank Diameter (ft):	13.08
Working Loss Product Factor:	1
Total Losses (lb):	2.2204

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Hot Mix Asphalt Tank - Horizontal Tank
Boise, Idaho

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Residual oil no. 6	1.97	0.25	2.22

Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Basis for Vapor Mol. Pressure Weight Calculations
190			387

Knife River, Inc.
Portable Hot-Mix Asphalt Plant Permit Application
Paved Road Traffic Potential to Emit Calculations

Assumptions:

Emission Factors for 1980's Vehicle Fleet, C (PM-10)[b]	0.00047 lb/vehicle mile traveled (vmt)	
Particle Size Multiplier, k (PM-10)[a]	0.016 lb/vmt	
Silt Loading (sL)[c]	120.0 g/m2	
Average weight of vehicles traveling road,W	12.8 tons	(20%, 40 ton dump trucks and 80%, 6 ton trucks)
Amount of paved road at facility	0.11 miles	
Max hourly throughput	280 ton/hr	
Max yearly throughput	325,000 ton/yr	
Number of round trips per hour	14	
Number of round trips per year	16250	

Calculations

$$\textit{PM-10 EF}^{d} = k(sL/2)^{0.65}x(W/3)^{1.5} - C$$
$$= 2.018 \text{ lb / vmt}$$

PM-10	0.222	lb
	1.1E-04	tons
PM-10 max hourly	**3.11**	**lb/hr**
	1.55E-03	**t/hr**
PM-10 yearly	**3,607**	**lb/yr**
	1.80	**t/yr**

[a] *EPA AP-42, Table 13.2.1-1, (December 2005)*
[b] *EPA AP-42, Table 13.2.1-2, (December 2005)*
[c] *EPA AP--42, Table 13.2.1-4, (December 2005)*
[d] *EPA AP-42, Equation 13.2.1-1, (December 2005)*

Knife River, Inc.
Portable Hot-Mix Asphalt Plant Permit Application
Unpaved Road Traffic Potential to Emit Calculations

Assumptions:

Particle Size Multiplier, k (PM-10)[a]	1.5	lb/vmt	
Silt Content[b]	4.8	%	
a (PM-10)[a]	0.9		
b (PM-10)[a]	0.45		
Average weight of vehicles traveling road, W	23	tons	(50%, 40 ton dump trucks and 50%, 6 ton trucks)
Amount of unpaved road at facility	0.15	miles	
Max hourly throughput	280	ton/hr	
Max yearly throughput	325,000	ton/yr	
Number of round trips per hour	14		
Number of round trips per year	16250		

Calculations

$$PM\text{-}10\ EF^{c} = k(s/12)^{a} x (W/3)^{b}$$
$$= 1.644 \text{ lb / vmt}$$

PM-10	0.247	lb
	1.2E-04	tons
PM-10 max hourly	**3.5**	**lb/hr**
	1.73E-03	**t/hr**
PM-10 yearly	**4,008**	**lb/yr**
	2.0	**t/yr**

[a] *EPA AP-42, Table 13.2.2-2, (Air CHIEF, April 2004)*
[b] *EPA AP--42, Table 13.2.2-1, (Air CHIEF, April 2004)*
[c] *EPA AP-42, Equation 13.2.2-1a, (Air CHIEF, April 2004)*

Appendix D

Modeling Protocol, IDEQ Approval Letter

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1410 NORTH HILTON, BOISE, ID 83706 · (208) 373-0502

C. L. "BUTCH" OTTER, GOVERNOR
TONI HARDESTY, DIRECTOR

January 18, 2008

Allan E. Cawrse
CH2M HILL
Boise, Idaho

RE: Modeling Protocol for the Proposed Portable Knife River Asphalt Plant, to be Initially Located near New Meadows, Idaho

Allan:

DEQ received your dispersion modeling protocol in early January, 2008. The modeling protocol was submitted on behalf of Knife River, Inc. (Knife River). The modeling protocol proposes methods and data for use in the ambient impact analyses of a Permit to Construct application for a new portable asphalt plant, initially estimated to be located near New Meadows, Idaho.

The modeling protocol has been reviewed and DEQ has the following comments:

- Comment 1: The application should provide documentation and justification for stack parameters used in the modeling analyses, clearly showing how stack gas temperatures and flow rates were estimated. In most instances, applicants should use typical parameters, not maximum temperatures and flow rates.

- Comment 2: The proposed receptor grid appears reasonable. However, it is the applicant's responsibility to use a sufficiently tight receptor network such that the maximum modeled concentration is reasonably resolved. If DEQ conducts verification modeling analyses with a tighter receptor grid and compliance with standards is no longer demonstrated, the permit will be denied. If a minimal setback distance is proposed, a 10-meter grid spacing within the first 50 meters will provide greater assurance of NAAQS compliance, especially if modeling results indicate levels are very near applicable standards.

- Comment 3: The submitted protocol indicated ISCST3 would be used for the modeling analyses. Subsequent discussion with you indicated the intent was to use AERMOD, and it was an oversight that the protocol had not been changed. The current regulatory version of AERMOD must be used for the impact analyses.

- Comment 4: The protocol indicated both Boise and Spokane meteorological data would be used in the analyses. Because of the questionable representativeness of those data to the New Meadows area or other areas where the plant may locate, the PM10 24-hour design concentration must be based on the maximum of 2nd highest modeled concentrations from both data sets. For other pollutants, the maximum of 1st high modeled concentrations must be used. When modeling TAPs, the concatenated 5-year data set may be used (use the period average option rather than the annual average).

- Comment 5: Unless impacts of adjacent facilities are specifically modeled, the plant will be restricted from locating within 1000 feet of another HMA, concrete batch plant, and/or a rock crushing plant.

- Comment 6: If Knife River requests the modeling analyses be used to support relocation of the plant, a generic plant layout with a circular ambient air boundary should be used. The minimum set back distance will be determined by the maximum distance between the receptor that just meets NAAQS (next receptor out from the most distant receptor that shows an exceedance of the standard) and the most distant emissions point from that receptor. If no exceedances are modeled, the setback distance will be the maximum distance between the ambient air boundary and the most distant emissions point.

DEQ's modeling staff considers the submitted dispersion modeling protocol, with resolution of the additional items noted above, to be approved. It should be noted, however, that the approval of this modeling protocol is not meant to imply approval of a completed dispersion modeling analysis. Please refer to the *State of Idaho Air Quality Modeling Guideline*, which is available on the Internet at http://www.deq.state.id.us/air/permits_forms/permitting/modeling_guideline.pdf, for further guidance.

To ensure a complete and timely review of the final analysis, our modeling staff requests that electronic copies of all modeling input and output files (including BPIP and AERMAP input and output files) are submitted with an analysis report. If DEQ provided model-ready meteorological data files, then these do not need to be resubmitted to DEQ with the application. If you have any further questions or comments, please contact me at (208) 373-0112.

Sincerely,

Kevin Schilling
Stationary Source Air Modeling Coordinator
Idaho Department of Environmental Quality
208 373-0112

Air Dispersion Modeling Protocol
Knife River Asphalt Plant
Pre-Permit Construction

New Meadows Vicinity, Idaho

Prepared for:

Knife River, Inc.

Submitted to:

Idaho Department of Environmental Quality

January 2008

Prepared By:

CH2MHILL

Project Background

Knife River, Inc. (Knife River) is proposing to locate a Portable Hot-Mix Asphalt Plant (HMA) and rock crusher in the vicinity of New Meadows, Idaho, CH2M HILL is requesting a 15-day review for pre-permit construction approval per IDAPA 58.01.01.213. An air quality impact analysis will be performed in support of a Permit-to-Construct (PTC) required under IDAPA 58.01.01.200.

Idaho regulation requires the facility applying for a Permit-to-Construct (PTC) to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS) and Toxic Air Pollutant (TAP) standards (IDAPA 58.01.01.210). Therefore, the HMA sources including a baghouse for the dryer and coater, the tank heater, heated asphalt storage, two generators, hopper loading, aggregate bin loading, truck loading, two fuel storage tanks, and 8 conveyor transfer points will be included with the portable HMA to demonstrate facility-wide compliance with the NAAQS for criteria pollutants and TAP standards. Note that the rock crusher will be operated as a separate source and is planned for a separate land parcel and its emissions are not included in this protocol.

This air dispersion modeling protocol is being submitted to IDEQ for approval to fulfill one of the pre-construction requirements prior to the initiation of the air quality modeling for the Portable HMA Plant. This document summarizes the modeling methodology that will be used to evaluate the facility's impacts to air quality with respect to criteria and toxic pollutants. It has been prepared based on the U.S. Environmental Protection Agency (EPA) *Guidelines on Air Quality Models* (GAQM), and the *State of Idaho Air Quality Modeling Guideline* (ID AQ-01, December 31, 2002).

Project Description

Location and Land Use

The exact location of the HMA Plant is yet to be determined; however Knife River intends to place the plant in the vicinity of the town of New Meadows, Adams County, Idaho. The land surrounding New Meadows is of uniform elevation and shares common use characteristics throughout. Based on discussions with the Idaho Department of Environmental Quality (IDEQ) during the project coordination meeting of December 20, 2007, the air model will run based on a typical, but non-specific location in the vicinity of New Meadows. For the purpose of modeling effort, the HMA plant is placed just east of New Meadows along Highway 55. This site was determined to be representative of the surrounding area. Auer's (1978) land-use classification method for determining urban vs. rural dispersion coefficients in the modeling indicates that more than 50 percent of the land use within three kilometers around the proposed facility appears to be rural. Modeling will be performed using the rural dispersion coefficients.

Emissions

Source Information

The modeling analysis will be performed using all proposed emission sources. The affect of building downwash at this specific plant site will be reviewed. Direction specific building downwash parameters will be calculated using the EPA Building Profile Input Program (BPIP), Version 95086.

Emission Source Information

The ten HMA sources for the facility are summarized in Table 1. Table 1 gives the sources parameters for both point sources and volumes sources. The fine and course aggregate bins and recycled asphalt bin emissions were combined as one volume source. The truck loading silo, and eight conveyor transfers for the HMA were also modeled as volume sources. The remaining sources are modeled as point sources. A draft figure of the Site Plan showing the location of emissions sources are included as an attachment to this protocol (see Figure 1).

Table 1
Source Parameters

Point Source Name	Source ID	Source Height (m)	Diameter (m)	Velocity (m/s)	Temperature (K)
HMA Dryer Baghouse	DRYBH	8	1.05	18.83	414
HMA Tank Heater	HEATER	3.7	0.15	134.3	414
HMA Generator 1	GEN1	2.1	0.10	35	616
HMA Generator 2	GEN2	2.3	0.15	60	616
Area Source Name	**Source ID**	**Release Height (m)**	**Easterly Length (m)**	**Temperature (K)**	
Fuel Storage Tank 1	FST1	3	0.10	297	
Fuel Storage Tank 2	FST2	3.5	0.10	297	
Asphalt Storage Tank 3	AST3	4.25	0.15	422	
Volume Source Name	**Source ID**	**Release Height (m)**	**Initial Horizontal Dim. (m)**	**Initial Vertical Dim. (m)**	
Material Handling /Bin Loading	AGGBIN	2	1.65	0.93	
	RAPBIN	2	0.709	0.93	
	AGUNLOAD	2	0.93	0.93	
	RAPUNLOAD	2	0.93	0.93	
Silo and Truck Loading	SILO	9.1	4.23	0.35	
HMA Conveyors	CONVEY	2	0.936	0.93	

Estimated Emissions

A preliminary estimate of the emissions was performed for this protocol for each source. The criteria pollutant emissions, by source, are shown in Tables 2 and 3. TAP emissions have been estimated for only the dryer, tank heater and silo loadout and compared to the screening emission limit (EL) specified in the regulation (IDAPA 58.01.01 585 and 586). Modeling will be performed for those TAPs whose combined new source emission rates are greater than the EL. Table 4 shows those TAPs with emissions above the EL.

Table 2.
Annual Emissions (tons/year)
Criteria Pollutants

Source ID	Source	PM-10	NOx	SO2	CO	VOC	HCl
DRYBH	HMA Dryer Baghouse	0.57	1.37	1.45	3.25	0.80	0.01
HEATER	HMA Tank Heater	0.23	0.30	0.99	0.06	0.01	NA
SILO	Silo and Truck Loading	0.28	NA	NA	0.63	4.02	NA
GEN1	HMA Generator 1	0.33	4.63	0.30	1.00	0.37	NA
GEN2	HMA Generator 2	0.32	10.08	1.59	2.68	0.28	NA
FST1	Fuel Storage Tank 1	NA	NA	NA	NA	1.42E-03	NA
FST2	Fuel Storage Tank 2	NA	NA	NA	NA	5.85E-04	NA
AST3	Asphalt Storage Tank 3	NA	NA	NA	NA	1.11E-03	NA
BIN1	Material Handling /Bin Loading	1.30	NA	NA	NA	NA	NA
CONVEY	HMA Conveyors	4.68	NA	NA	NA	NA	NA

Table 3.
Maximum Hourly Emission Rates (lb/hr)
Criteria Pollutants

Source ID	Source	PM-10	NOx	SO2	CO	VOC	HCl
DRYBH	HMA Dryer Baghouse	0.69	1.65	1.74	3.90	0.96	0.01
HEATER	HMA Tank Heater	0.27	0.36	1.19	0.08	0.01	NA
SILO	Silo and Truck Loading	0.33	NA	NA	0.76	4.83	NA
GEN1	HMA Generator 1	0.20	2.78	0.18	0.60	0.22	NA
GEN2	HMA Generator 2	0.38	12.10	1.91	3.21	0.34	NA
FST1	Fuel Storage Tank 1	NA	NA	NA	NA	3.24E-04	NA
FST2	Fuel Storage Tank 2	NA	NA	NA	NA	1.34E-04	NA
AST3	Asphalt Storage Tank 3	NA	NA	NA	NA	2.53E-04	NA
BIN1	Material Handling /Bin Loading	1.56	NA	NA	NA	NA	NA
CONVEY	HMA Conveyors	5.61	NA	NA	NA	NA	NA

Note:
1. The Portable HMA Plant operates 1,667 hours annually.
2. NA = Non Applicable

TABLE 4
Maximum Hourly Emissions for Toxic Air Pollutants (lb/hr)

Source ID	Acetaldehyde (3.00E-03)	Benzene (8.00E-04)	Benzo(a)-pyrene (2.0E-06)	Formaldehyde (5.10E-04	Methylene Chloride (1.60E-03)	Propionaldehyde (2.87E-02)	Quinone (2.70E-02)	Tetrachloroethene (1.60E-01)	Naphthalene (3.33 E-00)	POM (2.00E-06)	Arsenic (1.50E-06)	Beryllium (2.80E-05)	Cadmium (5.60E-07)	Chromium (5.60E-07)	Hexavalent Chromium (5.60E-07)	Mercury (1.00E-03)	Nickel (2.70E-05)	Phosphorus (7.00E-03)
Dryer	3.90E-01	1.17E-01	2.94E-06	9.30E-01		3.90E-02	4.80E-02		1.95E-01	1.64E-04	1.68E-04		1.23E-04	1.65E-03	1.35E-04	7.80E-04	1.89E-02	8.40E-03
Tank Heater		4.23E-06.	5.64E-05	4.99E-04					1.83E-04	1.13E-04	1.55E-03	4.53E-05	1.31E-04	2.82E-04		4.53E-05	1.55E-04	
Load-out/Silo		3.03E+00	3.92E-03		1.65E-02			1.60E-01	4.44E+00	5.68E-01								

Note: The Portable HMA Plant operates 1,667 hours annually.

Regulatory Review

Standards and Criteria Levels

Table 5 summarizes applicable criteria including:
- the significant contribution levels (SCL),
- the National Ambient Air Quality Standards (NAAQS).

Table 5
Regulatory Standards and Significance Levels

Pollutant	**Averaging Period**	**National Primary AAQS**		**Significant Contribution Level (□ug/m^3)**
		□ug/m^3	**ppm**	
CO	8-Hour	10,000	9	500
	1-Hour	40,000	35	2,000
NO_2	Annual	100	0.053	1
PM_{10}	Annual	50		1
	24-Hour	150		5
SO_2	Annual	80	0.03	1
	24-Hour	365	0.14	5
	3-Hour	1300	0.50	25

Modeling will be conducted to determine whether the proposed emissions will result in an impact greater than the applicable Idaho significant contribution levels (SCL) shown in Table 5. If the predicted impacts are not significant (that is, less than the SCL), the modeling is complete for that pollutant under that averaging time. If impacts are significant, a more refined analysis will be conducted for demonstration of compliance with the NAAQS. A description of the modeling methodology is presented below.

Dispersion Model

For the air quality analysis, the EPA- approved AERMOD (Version 07026) model is proposed. AERMOD will be run with the following options.
- Regulatory default options,
- Model will allow missing meteorological data,
- Direction-specific building downwash,
- Actual receptor elevations,
- Complex/intermediate terrain algorithms.

For the purpose of this model, an arbitrary model location was set up with the HMA located on a square-shaped 4.5 acre site. Once the first AERMOD model run is complete, the distance from the HMA to the nearest receptor that meets the emission standards will be used as the required setback distance for siting the HMA plant.

Meteorological Data

Boise, Idaho is located approximately 90 miles southeast of New Meadows, Idaho; Spokane, Washington is located approximately 190 miles northwest New Meadows. Both Boise and Spokane, meteorological data will be used from both locations resulting in two separate modeling runs, from which the worst case of each pollutant will be reported.

Ambient Conditions

Background air quality data recommended for modeling analyses was provided on 1/2/2007 by Kevin Schilling with IDEQ. Table 6 provides a summary of these background concentrations.

TABLE 6
Background Criteria Pollutant Concentrations ($\mu g/m^3$)

Pollutant	1-hr	3-hr	8-hr	24-hr	Annual
NO_x					17
CO	3,600		2,300		
SO_2		34		26	8
PM_{10}				73	26

Receptors

The ambient air boundary will be the fenceline, delineated by the area that is fenced within the plant boundary. The selection of receptors in AERMOD will be as follows:

- The first run will be a 500-meter coarse grid with a nested Cartesian grid of 100 meter-spaced receptors as follows:
  - Receptors will be placed at 25-meter intervals around the fenceline and extended approximately 100 meters.
  - The 50-meter grid will extend approximately 500 meters.
  - The 100-meter grid will extend approximately 1 km.
  - The 500-meter grid will extend approximately 5 km.
- If the maximum impact does not occur on the facility fenceline from the first run, a second run will be needed. A second run using a fine receptor grid will be centered on the point of maximum impact and re run using a 25-meter grid spacing extended approximately 200 meters.
- Receptor elevations will be extracted from 7.5 minute U.S. Geological Survey (USGS) Digital Elevation Model (DEM) files.

Preliminary Analysis

The preliminary analysis for each pollutant will be conducted as follows:

- If the predicted impacts are not significant (that is, less than the SCL), the modeling is complete for that pollutant under that averaging time.
- If impacts are significant, a more refined analysis, as described below, will be conducted.
- For NO_x, it will be initially assumed that all NO_x is converted to NO_2. If the resulting concentration exceeds the SCL, then the concentration will be multiplied by the default annual NO_2/NO_x ratio of 0.75 as suggested by EPA and compared to the SCL again. If the resulting concentrations still exceed the SCL, then a refined analysis will be conducted.
- Toxic pollutant impacts will be compared to the acceptable ambient concentrations for non-carcinogens or carcinogens, as applicable.

Refined Analyses – Criteria Pollutants

- Comparison to the Ambient Air Quality Standards
  - For pollutants with concentrations greater than the SCLs, the design concentration will be determined and compared to the NAAQS. Per IDEQ request, the worst-case, 6^{th} high for particulate matter concentration will be used; for all other pollutant concentrations the worst-case 2^{nd} high will be used. These concentration will include contributions from the facility, nearby sources, and ambient background concentrations. Background concentrations from Table 6 will be used to determine concentrations.
  - Emissions from an off-site rock crusher located in the vicinity of the HMA plant will be added to ambient background concentrations.
  - IDEQ will be contacted to identify nearby sources, if any, that need to be included in the analysis.

Output - Presentation of Results

The results of the air dispersion modeling analyses will be presented as follows:

- A description of modeling methodologies and input data,
- A summary of the results in tabular and, where appropriate, graphical form,
- Modeling files used for the AERMOD analysis will be provided with the application on compact disk,
- Any deviations from the methodology proposed in this protocol will be presented.

Appendix E

Modeling Results

Air Dispersion Modeling Protocol Editing, Comments, and Final Results

Knife River Asphalt Plant Pre-Permit Construction

New Meadows Vicinity, Idaho

Prepared for:

Knife River, Inc.

Submitted to:

Idaho Department of Environmental Quality

January 2008

Prepared By:

CH2MHILL

DEQ Modeling Protocol Approval Comments

Comment 1: *The application should provide documentation and justification for stack parameters used in the modeling analyses, clearly showing how stack gas temperatures and flow rates were estimated. In most instances, applicants should use typical parameters, not maximum temperatures and flow rates.*

Response: Stack parameters were provided by client through previous HMA Permits for same type portable HMA plants. Generator stack parameters were found on manufacturer specification sheets.

Comment 2: *The proposed receptor grid appears reasonable. However, it is the applicant's responsibility to use a sufficiently tight receptor network such that the maximum modeled concentration is reasonably resolved. If DEQ conducts verification modeling analyses with a tighter receptor grid and compliance with standards is no longer demonstrated, the permit will be denied. If a minimal setback distance is proposed, a 10-meter grid spacing within the first 50 meters will provide greater assurance of NAAQS compliance, especially if modeling results indicate levels are very near applicable standards.*

Response: Based on Knife River's request, the model was set to run with the portable HMA plant centrally located within a 15 acre site which is the most likely plot size. Hourly and annual production limits (325,000 tons per year, 280 tons per hour) were adjusted to ensure criteria pollutants will not exceed NAAQS compliance. A 25-meter spacing receptor grid along the fence line extending 50 meters out was used to ensure NAAQS compliance.

Comment 3: *The submitted protocol indicated ISCST3 would be used for the modeling analyses. Subsequent discussion with you indicated the intent was to use AERMOD, and it was an oversight that the protocol had not been changed. The current regulatory version of AERMOD must be used for impact analyses.*

Response: All modeling utilized Bee Line's *BEEST* program (version 9.60 and newer) which runs AERMOD, Version 07026.

Comment 4: *The protocol indicated both Boise and Spokane meteorological data would be used in the analyses. Because of the questionable representativeness of those data to the New Meadows Area or other areas where the plant may located, the PM10 24-hour design concentration must be based on the maximum of 2nd highest modeled concentration from both data sets. For other pollutants, the maximum of 1st high modeled concentrations must be used. When modeling TAPs the concatenated 5-year data set may be used (use the period average option rather than the annual average).*

Response: The model was run using both Boise and Spokane Meteorological data. The 1st highest modeled concentration from both data sets was used to confirm compliance on all pollutants except the 24-hour PM10 which was based on the 2nd highest modeled concentration. Results of modeling are shown in the Modeling Results Table below.

Comment 5: *Unless impacts of adjacent facilities are specifically modeled, the plant will be restricted from locating within 1,000 feet of another HMA, concrete batch plant, and /or a rock crushing plant.*

Response: The Knife River portable HMA plant applying to this permit application will not be sited within 656 feet of another HMA, concrete batch plant, and/or a rock crushing plant. This set-back distance is derived from the final Cement Batch Plant (CBP) Generic Modeling Protocol developed by the IDEQ. This generic modeling protocol specifies that a set-back of 200 meters (656 feet) or more is required for any CBP that may locate near a HMA or a rock crusher, as an example. The Knife River HMA may locate near a CBP, and the set-back distance of at least 656 feet will be maintained. (See "Air Dispersion Modeling Protocol: Request to Use DEQ Generic Modeling Results to Demonstrate Preconstruction Compliance with Idaho Air Quality Rules").

Comment 6: *If Knife River requests the modeling analyses be used to support relocation of the plant, a generic plant layout with a circular ambient air boundary should be used. The minimum set back distance will be determined by the maximum distance between the receptor that just meets NAAQS (next receptor out from the most distant receptor that shows an exceedance of the standard) and the most distant emissions point from that receptor. If no exceedances are modeled, the setback distance will be the maximum distance between the ambient air boundary and the most distant emissions point.*

Response: Based on Knife River's request, the minimal site size to be used to site the HMA plant will be 15 acres with the portable HMA centrally located. Hourly and annual production limits (325,000 tons per year, 280 tons per hour) were established in order to ensure that NAAQS criteria pollutant concentrations will not be exceeded exiting the 15 acre site. T-RACT analysis was required and included in this permit application for Total PAH, POM, Arsenic, Chromium, and Formaldehyde which exceeded the NAAQS.

Protocol Edits

ANNUAL HOURS OF OPERATION FOR KNIFE RIVER NEW MEADOWS HMA

Source ID	Source	Daily hours of operation
DRYBH	HMA Dryer Bag house	8
HEATER	HMA Tank Heater	24
SILO	Silo and Truck Loading	8
GEN1	HMA Generator 1	16
GEN2	HMA Generator 2	8
FST1	Fuel Storage Tank 1	24
FST2	Fuel Storage Tank 2	24
AST3	Asphalt Storage Tank 3	24
BIN1	Material Handling /Bin Loading	8
CONVEY	HMA Conveyors	8

ANNUAL HOURS OF OPERATION FOR KNIFE RIVER NEW MEADOWS HMA

Source ID	Source	Daily hours of operation
DRYBH	HMA Dryer Bag house	8
HEATER	HMA Tank Heater	24

Note: Annual production limit for HMA is 325,000 tons, hourly production limit is 280 tons.

Estimated Emissions

Table 2.
Annual Emissions (tons/year)
Criteria Pollutants

Source ID	Source	PM-10	NOx	SO2	CO	VOC	HCl
DRYBH	HMA Dryer Bag house*	0.37	0.89	0.94	2.11	0.52	0.003
HEATER	HMA Tank Heater***	0.16	0.21	0.69	0.10	0.01	NA
SILO	Silo and Truck Loading*	0.18	NA	NA	0.41	2.62	NA
GEN1	HMA Generator 1**	0.23	3.23	0.21	0.69	0.26	NA
GEN2	HMA Generator 2*	0.22	7.02	1.11	1.87	0.20	NA
FST1	Fuel Storage Tank 1***	NA	NA	NA	NA	0.001	NA
FST2	Fuel Storage Tank 2***	NA	NA	NA	NA	0.001	NA
AST3	Asphalt Storage Tank 3***	NA	NA	NA	NA	0.001	NA
BIN1	Material Handling /Bin Loading*	0.85	NA	NA	NA	NA	NA
CONVEY	HMA Conveyors*	0.17	NA	NA	NA	NA	NA

Table 3.
Maximum Hourly Emission Rates (lb/hr)
Criteria Pollutants

Source ID	Source	PM-10	NOx	SO2	CO	VOC	HCl

DRYBH	HMA Dryer Bag house*	0.64	1.54	1.62	3.64	0.90	0.01
HEATER	HMA Tank Heater***	0.27	0.36	1.19	0.17	0.02	NA
SILO	Silo and Truck Loading*	0.31	NA	NA	0.71	4.51	NA
GEN1	HMA Generator 1**	0.20	2.78	0.18	0.60	0.22	NA
GEN2	HMA Generator 2*	0.38	12.10	1.91	3.21	0.34	NA
FST1	Fuel Storage Tank 1***	NA	NA	NA	NA	0.0003	NA
FST2	Fuel Storage Tank 2***	NA	NA	NA	NA	0.0001	NA
AST3	Asphalt Storage Tank 3***	NA	NA	NA	NA	0.0003	NA
BIN1	Material Handling /Bin Loading*	1.46	NA	NA	NA	NA	NA
CONVEY	HMA Conveyors*	0.28	NA	NA	NA	NA	NA

Note:

1. The Portable HMA Plant operates 1,161 hours annually.
2. NA = Non Applicable

* 8 hours of operation per day

** 16 hours of operation per day

*** 24 hours of operation per day

TABLE 4
Maximum Hourly Emissions for Toxic Air Pollutants (lb/hr)

Source ID (IDAPA EL)*	Acetaldehyde (3.00E-03)	Benzene (8.00E-04)	Benzo(a)-pyrene (2.0E-06)	Formalde-hyde (5.10E-04)	Methylene Chloride (1.60E-03)	Propionalde-hyde (2.87E-02)	Quinine (2.70E-02)	Tetrachloro-ethene (1.60E-01)	Total PAH (9.1E-05)	POM (2.00E-06)	Total TCDD (1.50E-10)	Arsenic (1.50E-06)	Beryllium (2.80E-05)	Cadmium (5.60E-07)	Chromium (5.60E-07)	Hexavalent Chromium (5.60E-07)	Nickel (2.70E-05)	Phosphorus (7.00E-03)
Dryer	3.64 E-01	1.09E-01	2.74E-06	8.68E-01		3.64E-02	4.48E-02		6.57E-02	1.53 E-04	2.60E-10	1.57 E-04		1.15 E-04	1.54 E-03	1.26 E-04	1.76 E-02	7.84E-03
Tank Heater		4.23E-06.	5.64E-05	4.99E-04					4.03E-04	1.13E-04		1.55E-03	4.53E-05	1.31E-04	2.82E-04		1.55E-04	
Load-out/Silo		1.70E-03	2.20E-06		9.21E-06			8.97E-05	1.10E-02	3.18E-04								

Note: The Portable HMA Plant operates 1,161 hours annually.
*IDAPA 58.01.01.585, 586 – Screening emission levels (EL) for toxic non-carcinogens and toxic carcinogens

TABLE 5
Maximum Yearly Emissions for Toxic Air Pollutants (ton/yr)

Source ID	Acetaldehyde	Benzene	Benzo(a)-pyrene	Formalde-hyde	Methylene Chloride	Propionalde-hyde	Quinine	Tetrachloro-ethene	Total PAH	POM	Total TCDD	Arsenic	Beryllium	Cadmium	Chromium	Hexavalent Chromium	Nickel	Phosphorus
Dryer	2.11E-01	6.34E-02	1.79E-05	5.04E-01		2.11E-02	2.60E-02		1.44E-01	8.90E-05	1.51E-10	9.10E-05		6.66E-05	8.94E-04	7.31E-05	1.02E-02	4.55E03
Tank Heater		2.45E-06.	3.27E-05	2.89E-04					2.34E-04	6.55E-05		9.00E-04	2.63E-05	7.61E-05	1.64E-04		9.00E-05	
Load-out/Silo		9.85E-04	1.27E-06		5.35E-06			5.20E-05	8.00E-03	1.85E-04								

Note: The Portable HMA Plant operates 1,161 hours annually.
Yearly rate in tons per year entered in model for all toxics

Dispersion Model

For the air quality analysis, the EPA- approved AERMOD (Version 07026) model is proposed. AERMOD will be run with the following options.

- Regulatory default options,
- Model will allow missing meteorological data,
- Direction-specific building downwash,
- Actual receptor elevations,
- Complex/intermediate terrain algorithms.

For the purpose of this model, an arbitrary model location was set up with the HMA located centrally within a 15-acre site which was determined to be the most likely size by Knife River.

Meteorological Data

Boise, Idaho is located approximately 90 miles southeast of New Meadows, Idaho; Spokane, Washington is located approximately 190 miles northwest New Meadows. Both Boise and Spokane, meteorological data will be used from both locations resulting in two separate modeling runs, from which the worst case of each pollutant will be reported. Upon running the first set of modeling runs for both Boise and Spokane MET data, it was determined that the Boise MET data was the more conservative of the two and therefore was the only MET data used for further modeling.

Controls

To keep fugitive dust emissions to a minimum, and since placing misters on the screen and conveyor transfer points to control emission is not feasible due to adding water to the aggregate, all transfers and drop points will be kept to a minimum. In addition material handling (aggregate truck unloading) and material handling drop points (loading aggregate and RAP into bins) will be kept to a minimum; loader operators will be required to load aggregate into bins with as minimal of a drop as possible.

Dispersion Model

For the air quality analysis, the EPA- approved AERMOD (Version 07026) model is proposed. AERMOD will be run with the following options.

- Regulatory default options,
- Model will allow missing meteorological data,
- Direction-specific building downwash,
- Actual receptor elevations,
- Complex/intermediate terrain algorithms.

For the purpose of this model, an arbitrary model location was set up with the HMA located centrally within a 15-acre site which was determined to be the most likely size by Knife River.

Meteorological Data

Boise, Idaho is located approximately 90 miles southeast of New Meadows, Idaho; Spokane, Washington is located approximately 190 miles northwest New Meadows. Both Boise and Spokane, meteorological data will be used from both locations resulting in two separate modeling runs, from which the worst case of each pollutant will be reported. Upon running the first set of modeling runs for both Boise and Spokane MET data, it was determined that the Boise MET data was the more conservative of the two and therefore was the only MET data used for further modeling.

Controls

To keep fugitive dust emissions to a minimum, and since placing misters on the screen and conveyor transfer points to control emission is not feasible due to adding water to the aggregate, all transfers and drop points will be kept to a minimum. In addition material handling (aggregate truck unloading) and material handling drop points (loading aggregate and RAP into bins) will be kept to a minimum; loader operators will be required to load aggregate into bins with as minimal of a drop as possible.

Modeling Results for Knife River HMA Plant (units ug/m3)

Pollutant	Averaging Period	Background	Modeled Conc. (Boise)	Modeled Conc. (Spokane)	Overall Modeled Conc.	Criteria	Below Criteria	Year	Location
Criteria Pollutants									
CO	1-HR	3,600	153.29	**162.01**	3,762	40,000	Yes	1988	East Fence Line
CO	8-HR	2,300	96.98	**112.81**	2,413	10,000	Yes	1989	West Fence Line
NO_2	ANNUAL	17	**9.15**	7.64	26	100	Yes	1990	Northwest Fence Line
PM_{10}	24-HR*,**	73.0	**54.37**	44.94	127	150	Yes	5-yr	West Fence Line
	ANNUAL**	26	**3.01**	1.61	29	50	Yes	5-yr	West Fence Line
SO_2	ANNUAL	8	**1.55**	1.37	10	80	Yes	1992	Northwest Fence Line
	24-HR	26	**26.74**	23.69	53	365	Yes	1991	Northwest Fence Line
	3-HR	34	**88.37**	84.74	122	1300	Yes	1988	East Fence Line
Toxics									
Acetaldehyde**	Annual	0	0.02344	**0.02707**		0.4500	Yes	5-yr	Southeast Fence Line
Benzene**	Annual	0	0.00751	**0.00861**		0.1200	Yes	5-yr	Southeast Fence Line
Formaldehyde**	Annual	0	0.06291	**0.0717**		0.0770	Yes	5-yr	Southeast Fence Line
Methylene Chloroform**	Annual	0	**0.00001**	0.00000		0.2400	Yes	5-yr	West Fence Line
Propionaldehyde**	Annual	0	0.00234	**0.00271**		21.5	Yes	5-yr	Southeast Fence Line
Quinine**	Annual	0	0.00289	**0.00334**		20.0	Yes	5-yr	Southeast Fence Line
Tetrachloroethylene**	Annual	0	**0.00008**	0.00004		2.1	Yes	5-yr	West Fence Line
Banzo(a)pyrene**	Annual	0	**0.00002**	0.00002		0.0003	Yes	5-yr	West Fence Line
Arsenic**	Annual	0	**0.00055**	0.00041		0.0002	No	5-yr	West Fence Line
Beryllium**	Annual	0	**0.00002**	0.00001		0.0042	Yes	5-yr	West Fence Line
Cadmium**	Annual	0	**0.00005**	0.00004		0.0006	Yes	5-yr	West Fence Line
Chromium**	Annual	0	0.00016	**0.00019**		0.0001	No	5-yr	West Fence Line
Hexavalent Chromium**	Annual	0	**0.00001**	0.00001		0.0001	Yes	5-yr	East Fence Line
Nickel**	Annual	0	0.00116	**0.00135**		0.0042	Yes	5-yr	Southeast Fence Line
Phosphorus**	Annual	0	0.00051	**0.00058**		5.0000	Yes	5-yr	Southeast Fence Line
Total TCDD	Annual	0	**0.00000**	0.00000		2.2E-08	Yes	5-yr	Property Fence Line
POM**	Annual	0	**0.00035**	0.00017		0.0003	No	5-yr	West Fence Line
Total PAHs**	Annual	0	**0.02279**	0.02245		0.0140	No	5-yr	West Fence Line

Notes

*The 24-Hour PM10 concentration is for the 2nd High

** The toxics, 24 HR PM10, and Annual PM10 concentration used a combined 5 year meteorological data file.

Appendix F

T-RACT Analysis

T-RACT ANALYSIS
Portable Hot Mix Asphalt Plant
- Arsenic
- Chromium
- Formaldehyde
- Poly Aromatic Hydrocarbons (PAH) and
- Polycyclic Organic Matter (POM) Emissions

Knife River
Idaho Operations

Knife River operates paving material manufacturing operations in Idaho. Knife River has applied to the Idaho Department of Environmental Quality (IDEQ) for permit to construct a hot mix asphalt (HMA) plant. Dispersion modeling for the Knife River HMA plant indicates the emissions of five pollutants, arsenic, chromium, formaldehyde, Polyaromatic hydrocarbons (PAH) and polycyclic organic matter (POM) exceeds the Idaho Allowable Ambient Concentration (AAC) standards for Toxics and Carcinogens (AACC).

Emissions of these pollutants were estimated using emission factors published by the Environmental Protection Agency (EPA) AP-42 emissions factors for hot mix asphalt plants (Section 11.1), latest edition. The pollutants arsenic and chromium may be a contaminant found in liquid fuels that will be burned in the dryer of asphalt heater. The organic pollutants (formaldehyde, PAH, POM), may be formed as a result of exposure of organic liquids to combustion gases, and incomplete fuel combustion .

A toxics Reasonably Available Control Technology (T-RACT) review is required for pollutants that are predicted to exceed the AAC or the AACC. For the purposes of this T-RACT, the hot mix asphalt plant is defined as the hot asphalt heater and tank, the aggregate dryer and emissions control device, the hot asphalt storage and handling equipment and the aggregate handling stationary sources (conveyors and piles).

The definition of T-RACT is:

> *"An emission standard based on the lowest emission of toxic air pollutants that a particular source is capable of meeting by the application of control technology that is reasonably available, as determined by the Department, considering technological and economic feasibility. If control technology is not feasible, the emission standard may be based on the application of a design, equipment, work practice or operational requirement, or combination thereof"*

Once T-RACT has been determined, IDAPA 58.01.01.210.12(b) allows for this determination to be applied for pre-construction compliance for toxic air pollutants listed in IDAPA section 58.01.01.585 and 586. A factor of 10 may be applied to the applicable acceptable ambient concentration listed in Section 585 or 586. The modeled results may then be compared against the adjusted AAC or AACC.

This T-RACT analysis determines what level of control could reasonably be achieved for the control of arsenic, chromium, formaldehyde, PAH and POM emissions from a portable

HMA plant. The T-RACT must be technically feasible, environmentally sound, and economically achievable. Idaho T-RACT regulations are found at IDAPA 58.01.01.210.14.

Knife River HMA Emissions Sources and Controls

Inorganic Emissions Sources – Arsenic and Chromium

Knife River will operate two combustion sources that may emit arsenic and chromium under certain fuel use conditions. These combustion sources are the aggregate dryer and the hot asphalt heater. Both of these sources have the ability to use re-refined fuel oil, which may contain trace contaminants. According to the EPA emissions assessment for HMA Plants ("Hot Mix Asphalt Plants Emissions Assessment Report" EPA-454/R-00-019. December 2000, Attachment 1), the arsenic and chromium are emitted from the dryer or the asphalt tank heater when fired with liquid fuels. In this document, most of the contaminants such as arsenic and chromium were contained in "waste oil" that was obtained from service stations and repair shops that collected waste oil. These waste oil emission results were incorporated in the AP-42 Emissions factors for Hot Mix Asphalt plants.

The Knife River plant will use only commercially available diesel fuels, including re-refined fuel oil (RFO). RFO is different from waste oil in that it RFO is oil that is cleaned of impurities and blended with other oil to conform to new oil use specifications. In the re-refining process, waste oil is typically vacuum distilled, filtered, and hydrotreated to remove contaminants, (including metals). Re-refined oil typically meets the same specifications as new product. Note that Knife River will not use any waste oil in the dryer or asphalt heater that has not be re-refined to remove impurities such as solids, water, and other impurities typically removed by the re-refining process.

If metals did exist in the fuels, however, releases of arsenic and chromium would still be controlled. Emissions from the dryer, which contain combustion gases and particulate (PM) for the aggregate drying, are routed to the emissions control fabric filter. This baghouse is rated at 99.9% removal efficiency for PM. Particulate that may also contain arsenic and chromium (which exists as a particulate in flue gas) would be collected by the fabric filter. The collected particulate is routed back to the coater where it is mixed with the liquid asphalt cement to make the final product. In this manner, the metals that may be contained in the particulate are encapsulated into the hot mix and not released to the environment via the atmosphere. Note that even if arsenic and chromium contaminants did occur in the liquid fuels, the emissions reduction systems for arsenic and chromium include the use of the a high efficiency fabric filter, and the recycle of the fabric filter particulate catch back into the hot mix asphalt.

Organic Emissions Sources - Formaldehyde and POM/PAH

The Knife River plant may emit formaldehyde, POM and PAH. Formaldehyde is considered to be a degradation product of organic compounds formed during heating or combustion, while POM/PAH are typically considered to be products of incomplete combustion. PAH is a subset of POM.

According to the AP-42 emission factors for HMA plants, most of the formaldehyde is attributable to the storage silo and load-out operations. Other sources of formaldehyde include the combustion sources.

Emissions of formaldehyde from the silo loading and load-out are minimized by the use of a covered conveyor from the dryer to the silo. The conveyor from the dryer to the silo helps reduce off-gassing from the hot asphalt and minimizes any emissions of formaldehyde and other organics to the atmosphere. The hot asphalt is conveyed to a chute on the top of the silo, where it is dropped into the storage silo. The silo is closed except for the chute opening, to maintain hot asphalt temperatures. The asphalt is exposed to the atmosphere only the minimum time necessary during the production and transfer operations. This further minimizes the release of possible formaldehyde to the atmosphere.

The Knife River plant is equipped with an external liquid asphalt coater. The use of an external coater also minimizes formaldehyde and PAH/POM emissions. In most dryers, the liquid asphalt is added about mid-way in the drum dryer and allowed to mix with the heated aggregate. In the Knife River HMA system, the liquid asphalt is mixed external to the dryer in an enclosed mixer (the "coater"). The heated aggregate drops into the coater where it is combined with the hot liquid asphalt to form asphalt. The combustion gases do not directly contact the liquid asphalt in this design, and degradation and stripping of organics from the liquid asphalt is minimized in this operation. Note that the use of the external coater in the Knife River HMA plant minimizes the creation of formaldehyde and the stripping of volatile organic compounds.

EPA RACT/BACT/LAER Clearinghouse Review and AP-42

A review of technologies from the control of arsenic, chromium, formaldehyde, POM and PAH was performed. The Environmental Protection Agency (EPA) RACT/BACT/LAER Clearinghouse (RBLC) was reviewed to determine the types of controls that have been required on similar sources. The RBLC is a compilation of existing and proposed control technologies, permit limits, and emission estimates for a very wide variety of process and emission point sources in the US. This database was developed and is maintained by the EPA to provide information on emissions control technology and other information for air pollutants. The RBLC was reviewed for HMA plants and searched for other related categories, such as external combustion. The categories searched of the in the RBLC included:

- Asphalt Concrete Manufacturing
- Asphalt Processing
- Liquid Fuel & Liquid Fuel Mixtures (≤ 100 million Btu/hr)
- Distillate Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel)
- Other Liquid Fuel & Liquid Fuel Mixtures
- Other Fuel and Combinations (≤ 100 million Btu/hr)

For each category listed above, the RBLC was used to search for records relating to the control of arsenic, chromium formaldehyde, PAH and POM compounds specific to asphalt processing and manufacturing (mineral products) or related to fuel combustion. One record was found in the search of the nation-wide database. This was a record for a diesel fuel-fired emergency generator located at a power plant in Missouri. Formaldehyde was assigned an annual emission limitation at this facility of 10 tons per year. No controls were found to be appropriate for the control of formaldehyde, the annual emission limit was considered to be a pollution prevention limit.

No records were found in this nation-wide database that indicated that specific controls for arsenic, chromium PAH or POM compounds that have been applied to HMA plants, or to related small combustion sources. Copies of the RBLC records for the search criteria are included as Attachment 2.

T-RACT Analysis and Results

The T-RACT determination procedure is defined at IDAPA 58.01.01.210.14. This procedure requires various aspects of control technologies to be considered. For the Knife River HMA, a search of the national EPA RBL Clearinghouse demonstrated that no add-on technologies were identified as feasible for the control of arsenic, chromium, formaldehyde, PAH and POM emissions in the fuel combustion and asphalt processing/manufacturing (mineral products) process types. Since no add-on control technologies for the control of arsenic and chromium compounds were identified, no cost-effectiveness analysis can or should be attempted. In the absence of any controls that were identified for this HMA source; the emission standard may be based on the application of a design, equipment, work practice or operational requirement, or combination thereof.

Based on the review of the RBLC and the discussion of the emissions control systems in place on the Knife River HMA plant; T-RACT has been determined to be:

> **Arsenic and Chromium -** The use of virgin petroleum or RFO fuels. Waste fuels such as crankcase lubricants that have not gone through the re-refining process are not considered T-RACT. In addition, T-RACT for arsenic and chromium is the use of a high-efficiency fabric filter installed on the dryer exhaust..
>
> **Formaldehyde –** Only one record for the control of emissions was found in the RBLC database. This record applied to a diesel generator, and no control equipment was required. The use of a covered conveyor from the coater to the top-loading silo chute minimizes emissions from the conveyor system. In addition, the use of an external coater minimizes the direct contact of dryer gases with the liquid asphalt. The use of the external coater minimizes the potential for formation of formaldehyde.
>
> **POM and PAH -** The use of an external coater minimizes the direct contact of dryer gases with the liquid asphalt. The use of the external coater minimizes the potential for stripping of POM from the liquid asphalt. In addition the small tank heater and HMA dryer will operate in accordance with manufacturer specifications for good

combustion practices. Good combustion practices for these emission sources will minimize the formation of PAH and POM.

Air Dispersion Modeling Results and the T-RACT Review

Once T-RACT has been determined, IDAPA 58.01.01.210.12(b) allows for this determination to be used for pre-construction compliance for toxic air pollutants listed in IDAPA section 58.01.01.585 and 586. Arsenic, chromium formaldehyde, PAH and POM compounds are air toxics listed in these sections. A factor of 10 may be applied to the applicable acceptable ambient concentration listed in Sections 585 and 586. The modeled results may then be compared against the T-RACT adjusted AAC or AACC. The results of these adjustments are shown in Table 1.

Table 1. Air Toxics and Comparison with AAC/AACC After TRACT 10x Adjustment

Pollutant	Averaging Period	Background	Modeled Conc. (Boise)	Modeled Conc. (Spokane)	10x Adjusted Criteria	Below Criteria	Year	Location
Formaldehyde**	Annual	0	0.06291	0.0717	0.770	Yes	5-yr	Southeast Fence Line
Arsenic**	Annual	0	0.00055	0.00041	0.002	Yes	5-yr	West Fence Line
Chromium**	Annual	0	0.00016	0.00019	0.001	Yes	5-yr	West Fence Line
POM	Annual	0	0.00035	0.00017	0.003	Yes	5-yr	West Fence Line
Total PAHs	Annual	0	0.02279	0.02245	0.14	Yes	5-yr	West Fence Line

Notes

Summary

A review of the comprehensive RBLC concludes that no emission control devices are available for the control of arsenic, chromium, formaldehyde and PAH/POM emissions from a HMA batch plant. One annual emission limit for formaldehyde was found to be applied to a diesel emergency generator at a power plant, and no specific controls were prescribed. The current Knife River HMA plant emissions control devices, equipment type and arrangement, and good operating practices are concluded to constitute T-RACT.

The application of T-RACT allows for an adjustment to the AAC or the AACC for arsenic, chromium, formaldehyde, PAH and POM. With the 10-fold adjustment allowed to the ambient standards, these pollutants meet the AAC or AACC as found in IDAPA 58.01.01.585 and 586.

Attachments:

Attachment 1. EPA AP-42 Emissions Support Document. "Hot Mix Asphalt Plants Emissions Assessment Report." EPA-454/R-00-019, December 2000.

Attachment 2. EPA RBL Clearinghouse Search Documents for Hot Mix Asphalt Production and External Combustion Categories.

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Help **PERMIT DATE**

From : 1/1/1998 (MM/DD/YYYY)

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Default = Last 10 years. Permits go back to 1970.

Help **PROCESS INFORMATION**

Process Type:
13.200 - Liquid Fuel & Liquid Fuel Mixtures (≤100 million BTU/H)

Process Name Contains:

A blank box finds all processes under type specified above.

As

Help **POLLUTANT NAME**

Arsenic / Arsenic Compounds

Help **CORPORATE/COMPANY OR FACILITY NAME CONTAINS:**

A blank box finds all company and plant names.

Help **FACILITY STATE**

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List of Reports Help

No matching RBLC facilities found.

Criteria used for search:

Permit Date Between 1/1/1998 And 2/5/2008
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And Pollutant Name is Arsenic / Arsenic Compounds

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Default = Last 10 years. Permits go back to 1970.

Help **PROCESS INFORMATION**

Process Type:
13.200 - Liquid Fuel & Liquid Fuel Mixtures (≤100 million BTU/H)

Process Name Contains:

A blank box finds all processes under type specified above.

Cr

Help **POLLUTANT NAME**

Chromium / Chromium Compounds, -3 & -6

Help **CORPORATE/COMPANY OR FACILITY NAME CONTAINS:**

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Criteria used for search:

Permit Date Between 1/1/1998 And 2/5/2008
And Process Type Contains "13.2"
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Help **PROCESS INFORMATION**

Process Type:
13.220 - Distillate Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel)

Process Name Contains:

A blank box finds all processes under type specified above.

As

Help **POLLUTANT NAME**

Arsenic / Arsenic Compounds

Help **CORPORATE/COMPANY OR FACILITY NAME CONTAINS:**

A blank box finds all company and plant names.

Help **FACILITY STATE**

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Criteria used for search:

Permit Date Between 1/1/1998 And 2/5/2008
And Process Type Contains "13.22"
And Pollutant Name is Arsenic / Arsenic Compounds

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Help **PROCESS INFORMATION**

Process Type:
13.220 - Distillate Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel)

Process Name Contains:

A blank box finds all processes under type specified above.

Cr

Help **POLLUTANT NAME**

Chromium / Chromium Compounds, -3 & -6

Help **CORPORATE/COMPANY OR FACILITY NAME CONTAINS:**

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And Process Type Contains "13.22"
And Pollutant Name is Chromium / Chromium Compounds, -3 & -6

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Help **PROCESS INFORMATION**

Process Type:
13.290 - Other Liquid Fuel & Liquid Fuel Mixtures

Process Name Contains:

A blank box finds all processes under type specified above.

ds

Help **POLLUTANT NAME**

Arsenic / Arsenic Compounds

Help **CORPORATE/COMPANY OR FACILITY NAME CONTAINS:**

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Help **FACILITY STATE**

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No matching RBLC facilities found.

Criteria used for search:

Permit Date Between 1/1/1998 And 2/5/2008
And Process Type Contains "13.29"
And Pollutant Name is Arsenic / Arsenic Compounds

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Help **PROCESS INFORMATION**

Process Type:
13.290 - Other Liquid Fuel & Liquid Fuel Mixtures

Process Name Contains:

A blank box finds all processes under type specified above.

Cr

Help **POLLUTANT NAME**

Chromium / Chromium Compounds, -3 & -6

Help **CORPORATE/COMPANY OR FACILITY NAME CONTAINS:**

A blank box finds all company and plant names.

Help **FACILITY STATE**

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Criteria used for search:

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And Process Type Contains "13.29"
And Pollutant Name is Chromium / Chromium Compounds, -3 & -6

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Help **PERMIT DATE**

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Default = Last 10 years. Permits go back to 1970.

Help **PROCESS INFORMATION**

Process Type:
13.900 - Other Fuels and Combinations (≤100 million BTU/H)(e.g., solid/liquid, liquid/gas)

Process Name Contains:

A blank box finds all processes under type specified above.

ds

Help **POLLUTANT NAME**

Arsenic / Arsenic Compounds

Help **CORPORATE/COMPANY OR FACILITY NAME CONTAINS:**

A blank box finds all company and plant names.

Help **FACILITY STATE**

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Criteria used for search:

Permit Date Between 1/1/1998 And 2/5/2008
And Process Type Contains "13.9"
And Pollutant Name is Arsenic / Arsenic Compounds

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Help **PERMIT DATE**

From : 1/1/1998 (MM/DD/YYYY)

To: 2/5/2008 (MM/DD/YYYY)

Default = Last 10 years. Permits go back to 1970.

Help **PROCESS INFORMATION**

Process Type:

13.900 - Other Fuels and Combinations (≤100 million BTU/H)(e.g., solid/liquid, liquid/gas)

Process Name Contains:

A blank box finds all processes under type specified above.

Cr

Help **POLLUTANT NAME**

Chromium / Chromium Compounds, -3 & -6

Help **CORPORATE/COMPANY OR FACILITY NAME CONTAINS:**

A blank box finds all company and plant names.

Help **FACILITY STATE**

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Criteria used for search:

Permit Date Between 1/1/1998 And 2/5/2008
And Process Type Contains "13.9"
And Pollutant Name is Chromium / Chromium Compounds, -3 & -6

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Advanced Search

Help **PERMIT DATE**

From : 1/1/1998 (MM/DD/YYYY)

To: 2/5/2008 (MM/DD/YYYY)

Default = Last 10 years. Permits go back to 1970.

Help **PROCESS INFORMATION**

Process Type:
19.900 - Other Misc. Combustion

Process Name Contains:

A blank box finds all processes under type specified above.

AS

Help **POLLUTANT NAME**

Arsenic / Arsenic Compounds

Help **CORPORATE/COMPANY OR FACILITY NAME CONTAINS:**

A blank box finds all company and plant names.

Help **FACILITY STATE**

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Criteria used for search:

Permit Date Between 1/1/1998 And 2/5/2008
And Process Type Contains "19.9"
And Pollutant Name is Arsenic / Arsenic Compounds

You should go back to the standard search form and respecify the criteria you used or select another portion of the database to search.